THORLABS

## Large Area InGaAs Amplified Photodetectors

# PDA20C / PDA20C/M Operation Manual

2012

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**We aim to develop and produce the best solution for your application in the field of optical measurement technique. To help us to come up to your expectations and develop our products permanently we need your ideas and suggestions. Therefore, please let us know about possible criticism or ideas. We and our international partners are looking forward to hearing from you.**

**Thorlabs**

**WARNING**

**Sections marked with this heading explain dangers that might result in personal injury or death. Always read the associated information carefully before performing the indicated procedure.**

**ATTENTION**

**Paragraphs preceded by this symbol in the manual explain hazards that could damage the instrument and connected equipment or may cause loss of data.**

**NOTE**

**This manual also contains "NOTES" and "HINTS" written in this form.**

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# 1 General Information

The PDA20C / PDA20C/M is a wideband amplified, large area InGaAs detector designed for detection of light signals from DC to 5 MHz. A buffered output drives a 50 Ω input impedance up to 3.5 volts into 50 Ohm loads.

The PDA20C / PDA20C/M housing includes a removable threaded coupler that is compatible with any number of Thorlabs 1" and ½" threaded accessories. This allows convenient mounting of external optics, light filters and apertures, as well as providing an easy mounting mechanism using the Thorlabs cage assembly accessories. The PDA20C / PDA20C/M has three 8-32 (M4 for /M-version) tapped mounting hole with a 0.25" mounting depth and includes a power supply.

## 1.1 Safety

**Attention**

**All statements regarding safety of operation and technical data in this instruction manual will only apply when the unit is operated correctly as it was designed for.**

**Only with written consent from *Thorlabs* may changes to single components be carried out or components not supplied by *Thorlabs* be used.**

**This precision device is only transportable if duly packed into the complete original packaging. If necessary, ask for a replacement package.**

## 1.2 Unpacking

Inspect the shipping container for damage.

If the shipping container seems to be damaged, keep it until you have inspected the contents and you have inspected the PDA20C mechanically and electrically.

Verify that you have received the following items within the package:

- PDA20C / PDA20C/M Amplified Photodetector
- Metal cover cap
- LDS1212-1 power supply (±12V, 0.2A), 110V or 230V line voltage
- Operation manual

Thorlabs offers a DC power supply cable to PDA20C, the PDA-C-72. This cable has a connector on one end and open wires at the other. In section 5.3 (page 8 ) the pin-out of the PDA20C DC power jack is shown.

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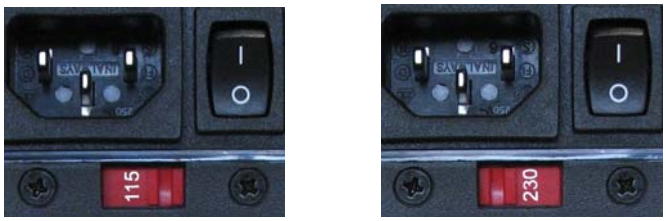
## 2 Getting started

- Unpack the optical head, install a Thorlabs TR-series ½" diameter post into one of the 8-32 (M4 on -Metric version) tapped holes, located on the bottom and side of the sensor, and mount into a PH-series post holder.
- Switch the power supply to your local main voltage (100-120 VAC or 220 V-240 VAC)




Switchable power supply for 115 V and 230 V

- Connect the power supply 3-pin plug into the mating receptacle on the PDA20C.
- Plug the power supply into a outlet
- Attach a 50Ω coaxial cable (i.e. RG-58U) to the output of the PDA20C. When running cable lengths longer than 12" we recommend terminating the opposite end of the coax with a 50Ω resistor (Thorlabs p/n T4119) for maximum performance.

## 3 Operating the PDA20C

The PDA20C is switched on by the 'POWER' Slide switch, located on the side wall of the optical sensor.

The light to voltage conversion can be estimated by factoring the wavelength-dependent responsivity of the InGaAs detector with the transimpedance gain as shown below:

output (V/W) = transimpedance gain (V/A) x responsivity (A/W)

The maximum output of the PDA20C is 10V for high impedance loads and 3.5V for 50Ω loads. The output signal should be below the maximum output voltage to avoid saturation. If necessary, use external neutral density filters to reduce the input light level.

For maximum linearity performance when measuring focused beams, fiber outputs, or small diameter beams, do not exceed a maximum intensity of 10mW/cm².

## 4 Maintenance and Repair

Protect the PDA20C (~/M) from adverse weather conditions, it's are not water resistant.

PDA20C (~/M) does not contain any serviceable by the user parts. Do not open the enclosure.

If your PDA20C needs repair, please contact Thorlabs for return instructions, see section 10 Thorlabs Worldwide Contacts, at page 12.

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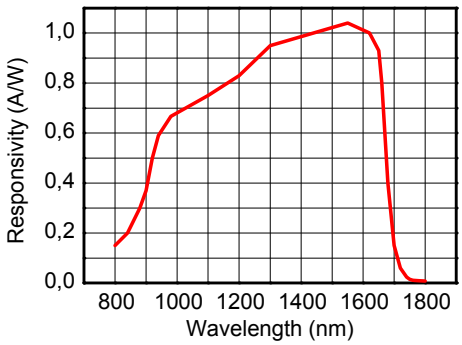
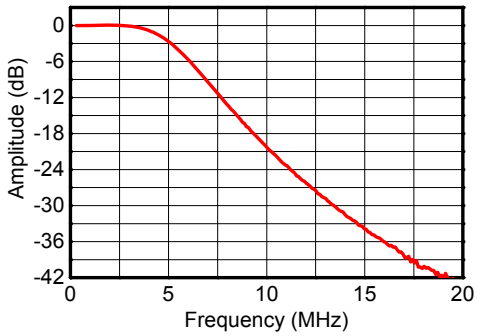
# 5 Technical Data

## 5.1 PDA20C Spectral Responsivity and Frequency Response




Spectral Responsivity




Frequency Response

| **Electrical Specification** | |
|---|---|
| Detector | InGaAs |
| Active Area | Ø 2.0mm |
| Wavelength Range | 800 - 1700 nm |
| Peak Response | 1 A/W @ 1550 nm |
| Bandwidth | DC to (5.0 ± 0.2) MHz |
| NEP | 22 pW / √Hz |
| Noise (RMS) | 11 mV |
| Dark Offset (max.) | ± 25 mV |
| Output Voltage<br>Hi-Z<br>50 Ω | <br>0 to 10 V<br>0 to 3.5 V |
| Transimpedance Gain<br>Hi-Z<br>50 Ω | <br>500 kV/A<br>175 kV/A |
| General | |
| On / Off Switch | slide |
| Output | BNC |
| Size (detector w/o power supply) | 70 mm x 48 mm x 21 mm<br>(2.8” x 1.9” x 0.83”) |
| Weight (detector w/o power supply) | 0.06 kg |
| Operating Temperature Range | 10°C to 50°C |
| Storage Temperature Range | -25°C to 70°C |
| Power Supply Input | 100 - 120 / 220 - 240 VAC, switchable<br>50-60Hz, 5VA |
| Power Supply Output | + 12 / -12 VDC |

All measurements performed with 50 Ω load unless stated otherwise.

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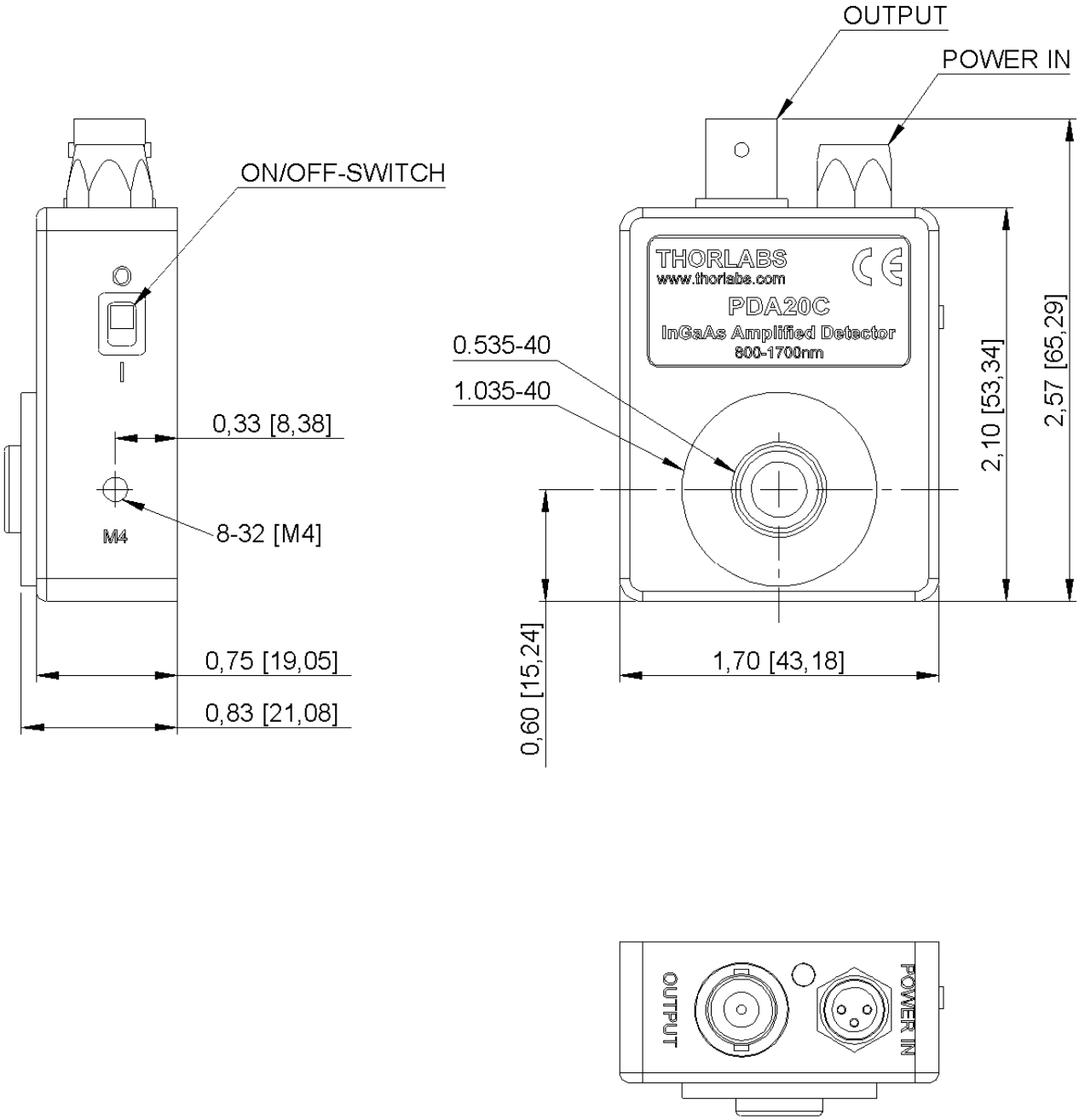
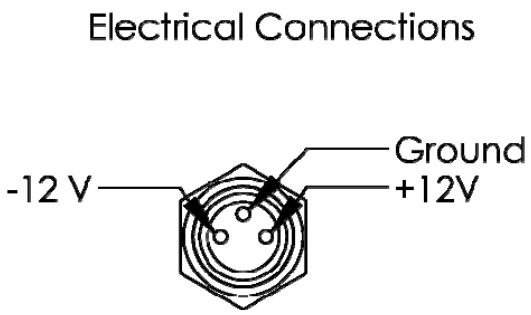
## 5.2 Mechanical Drawing




## 5.3 Pin-out of the PDA20C DC power jack

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# 6 Certifications and Compliances

| Category | Standards or description | | |
|---|---|---|---|
| EC Declaration of Conformity – EMC | Meets intent of Directive 2004/108/EC [1] for Electromagnetic Compatibility. Compliance was demonstrated to the following specifications as listed in the Official Journal of the European Communities: | | |
| | EN 61326-1:2006 | Electrical Equipment for Measurement, Control and Laboratory Use – EMC Requirements – Part 1: General Requirements:<br>Immunity: complies with basic immunity test requirements [2].<br>Emission: complies with EN 55011 Class B Limits [2,3]<br>IEC 61000-3-2 and IEC 61000-3-3. | |
| | IEC 61000-4-2 | Electrostatic Discharge Immunity (Performance Criterion A) | |
| | IEC 61000-4-3 | Radiated RF Electromagnetic Field Immunity (Performance Criterion A) | |
| | IEC 61000-4-4 | Electrical Fast Transient / Burst Immunity (Performance Criterion A) | |
| FCC EMC Compliance | Emissions comply with the Class B Limits of FCC Code of Federal Regulations 47, Part 15, Subpart B [2,3]. | | |
| EC Declaration of Conformity - Low Voltage | Compliance was demonstrated to the following specification as listed in the Official Journal of the European Communities:<br>Low Voltage Directive 2006/95/EC [4] | | |
| | EN 61010-1:2001 | | Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use – Part 1: General Requirements |
| U.S. Nationally Recognized Testing Laboratory Listing | UL 61010-1 2nd ed. | | |
| | ISA-82.02.01 2nd ed. | | |
| Canadian Certification | CAN/CSA C22.2 No. 61010-1 2nd ed. | | |
| Additional Compliance | IEC 61010-1:2001 | | |
| Equipment Type | Test and measuring | | |
| Safety Class | Class I equipment (as defined in IEC 60950-1:2001) | | |

[1] Replaces 89/336/EEC.

[2] Compliance demonstrated using high-quality shielded interface cables shorter than or equal to 3 meters.

[3] Emissions, which exceed the levels required by these standards, may occur when this equipment is connected to a test object.

[4] Replaces 73/23/EEC, amended by 93/68/EEC.

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# 7 Warranty

*Thorlabs* warrants material and production of the PDA20C (~/M) for a period of 24 months starting with the date of shipment. During this warranty period *Thorlabs* will see to defaults by repair or by exchange if these are still entitled to warranty. For warranty repairs or service the unit must be sent back to *Thorlabs Germany* or to a place determined by *Thorlabs*. The customer will carry the shipping costs back to *Thorlabs,* in case of warranty repairs *Thorlabs* will carry the shipping costs back to the customer. If no warranty repair is applicable the customer will also carry the costs for back shipment. If the unit is sent back to *Thorlabs* from abroad the customer will carry all shipping costs, duties etc. which should arise for sending the goods back to *Thorlabs*.

*Thorlabs* warrants the hardware and software determined by *Thorlabs* for this unit to operate without fault provided that they are handled according to our statements. However, *Thorlabs* does not warrant a fault free or uninterrupted operation of the unit, of the software or firmware for special applications nor this operation manual to be fault free. We will not carry responsibility for ensuing damages.

**Restriction of warranty**

The aforementioned warranty does not cover errors and defects being the result of improper treatment, software and interface not supplied by us, modification, misuse or operation outside the defined ambient conditions stated by us or unauthorized maintenance.

Further claims will not be consented to and will not be acknowledged. *Thorlabs* does explicitly not warrant the usability or the economical use for certain cases of application.

*Thorlabs* reserves the right to change this operation manual or the technical data of the described unit at any time.

# 8 Copyright

*Thorlabs GmbH* has taken every possible care in preparing this Operation Manual. We however assume no liability for the content, completeness or quality of the information contained therein. The content of this manual is regularly updated and adapted to reflect the current status of the software. We furthermore do not guarantee that this product will function without errors, even if the stated specifications are adhered to.

Under no circumstances can we guarantee that a particular objective can be achieved with the purchase of this product.

Insofar as permitted under statutory regulations, we assume no liability for direct damage, indirect damage or damages suffered by third parties resulting from the purchase of this product. In no event shall any liability exceed the purchase price of the product.

Please note that the content of this User Manual is neither part of any previous or existing agreement, promise, representation or legal relationship, nor an alteration or amendment thereof. All obligations of *Thorlabs GmbH* result from the respective contract of sale, which also includes the complete and exclusively applicable warranty regulations. These contractual warranty regulations are neither extended nor limited by the information contained in this User Manual. Should you require further information on this product, or encounter specific problems that are not discussed in sufficient detail in the User Manual, please contact your local *Thorlabs* dealer or system installer.

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# 9 Thorlabs “End of Life” Policy (WEEE)

As required by the WEEE (Waste Electrical and Electronic Equipment Directive) of the European Community and the corresponding national laws, Thorlabs offers all end users in the EC the possibility to return “end of life” units without incurring disposal charges.

This offer is valid for Thorlabs electrical and electronic equipment

- sold after August 13th 2005
- marked correspondingly with the crossed out “wheelie bin” logo (see below)
- sold to a company or institute within the EC
- currently owned by a company or institute within the EC
- still complete, not disassembled and not contaminated

As the WEEE directive applies to self contained operational electrical and electronic products, this “end of life” take back service does not refer to other Thorlabs products, such as

- pure OEM products, that means assemblies to be built into a unit by the user (e. g. OEM laser driver cards)
- components
- mechanics and optics
- left over parts of units disassembled by the user (PCB’s, housings etc.).

If you wish to return a Thorlabs unit for waste recovery, please contact Thorlabs or your nearest dealer for further information.

Waste treatment on your own responsibility
If you do not return an “end of life” unit to Thorlabs, you must hand it to a company specialized in waste recovery. Do not dispose of the unit in a litter bin or at a public waste disposal site.

**Ecological background**
It is well known that WEEE pollutes the environment by releasing toxic products during decomposition. The aim of the European RoHS directive is to reduce the content of toxic substances in electronic products in the future.
The intent of the WEEE directive is to enforce the recycling of WEEE. A controlled recycling of end of live products will thereby avoid negative impacts on the environment.

**Crossed out “wheelie bin” symbol**

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# 10 Thorlabs Worldwide Contacts

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